

WHAT IS CLAIMED IS:

1. A system for detecting predefined events occurring in operating power generation equipment and for diagnosing and responding to the predefined events, the system comprising:

an on-site monitor for analyzing operating data collected from the power generation equipment and for determining if any of the predefined events occurred during operation of the power generation equipment;

a plurality of sensors for collecting the operating data from the power generation equipment and for transferring the operating data to the monitor;

a remote management system for storing and retrieving historical data pertaining to the operation of fleet power generation equipment and to the occurrence of the predefined events in the fleet power generation equipment and for storing and analyzing the operating data collected from the power generation equipment and the event determination; and

at least one diagnostic tool for using the operating data, event determination and historical data to decide how to respond to the occurrence of any predefined events in the power generation equipment.

2. The system of claim 1 wherein the plurality of sensors are selected from the group consisting of temperature, pressure and flow sensors.

3. The system of claim 1 further comprising a communications device for transferring to the remote management system the operating data and event determinations from the on-site monitor.

4. The system of claim 1 further comprising an analysis platform for analyzing whether any predefined events have occurred, the analysis platform including a first program resident in the monitor and a second program resident in the remote management system.

5. The system of claim 4, wherein the monitor further comprises a first data storage device which contains the operating data collected by the plurality of sensors.

6. The system of claim 5, wherein the remote management system further comprises a second data storage device which contains the historical data pertaining to the operation of the fleet power generation equipment, and the event determinations and the operating data collected by the plurality of sensors.

7. The system of claim 4 wherein the first program is a continuous diagnostic engine analysis software and the second program is a central calculating engine analysis software.

8. The system of claim 7 wherein the continuous diagnostic engine analysis software determines the state of the power generation equipment by comparing sensor operating data with equipment operating data provided by manufacturers of the power generation equipment to

determine whether any of sensor data exceeds the manufacturer's operating limits for the power generation equipment and generates an alarm when it detects the occurrence of any predefined events.

9. The system of claim 7 wherein the continuous diagnostic engine analysis software analyzes the operating data collected by the plurality of sensors using standard algorithms and complex information and generates an alarm when it detects the occurrence of any predefined events.

10. The system of claim 4 wherein the analysis platform uses procedural and behavioral algorithms to provide information about the operation of the power generation equipment.

11. The system of claim 1 wherein the coaching tools use the historical data to either determine the likely cause of the event and an action plan for responding to the event or predict the consequences of the event and determine a preventive action plan in response to the event.

12. The system of claim 1 wherein the on-site monitor and remote management systems include sensor metadata that is information about how and when operating data for the power generation equipment is collected by the plurality of sensors and the particular units used to measure the collected operating data.

13. The system of claim 12 wherein the sensor metadata includes timestamps relating to the times that

operating data is collected and recorded and the identification of the particular sensors collecting the data.

14. The system of claim 12 wherein the sensor metadata includes sensor alias mappings for identifying the sensors corresponding to a customer site where the power generation equipment is located.

15. The system of claim 12 wherein the sensor metadata includes range values to validate the collected sensor operating data to insure that it is within the manufacturer's range for such data.

16. The system of claim 1 wherein the on-site monitor and remote management system are each a computer.

17. The system of claim 1 wherein the at least one coaching tool is selected from the group consisting of turbine sequencing, turbine alarms and engineering operational algorithms, and operational data.

18. A system for detecting predefined events occurring in operating power generation equipment at a customer location and for diagnosing and responding to the predefined events, the system comprising:

a plurality of sensors at the customer location for monitoring the power generation equipment and collecting operating data from the power generation equipment;

a monitor at the customer location for analyzing the operating data collected from the power generation

equipment and for determining if any of the predefined events occurred during operation of the equipment;

a management system at a location different from the customer location for storing and retrieving historical data pertaining to the operation of fleet power generation equipment and to the occurrence of the predefined events in the fleet power generation equipment;

a communications device for transferring to the management system the operating data collected by the plurality of sensors and the determinations by the monitor of whether any of the predefined events occurred;

an analysis platform for analyzing whether any predefined events have occurred, the analysis platform including a first program resident in the monitor and a second program resident in the management system; and

a plurality of coaching tools for using the collected operating data, determinations by the on-site monitor of whether any of the predefined events occurred, and historical data to determine the likely cause of any predefined events that have occurred and an action plan for responding to the events or to predict the consequences of the events and determine preventive action plans in response to the events.

19. The system of claim 18 wherein the plurality of sensors are selected from the group consisting of temperature, pressure and flow.

20. The system of claim 18 further comprising system controls for controlling the operation of the power generation equipment and for transferring the operating data to the monitor.

21. The system of claim 18, wherein the monitor further comprises a first data storage device which contains the power generation equipment operating data collected by the plurality of sensors.

22. The system of claim 18, wherein the management system further comprises a second data storage device which contains the historical data pertaining to the operation of the fleet power generation equipment and to the occurrence of the predefined events and the operating data collected by the plurality of sensors.

23. The system of claim 18 wherein the first program is a continuous diagnostic engine analysis software and the second program is a central calculating engine analysis software.

24. The system of claim 23 wherein the continuous diagnostic engine analysis software determines the state of the power generation equipment by comparing sensor operating data with equipment operating data provided by manufacturers of the power generation equipment to determine whether any of sensor data exceeds the manufacturer's operating limits for the power generation equipment and generates an alarm when it detects the occurrence of any predefined events.

25. The system of claim 23 wherein the continuous diagnostic engine analysis software analyzes the operating data collected by the plurality of sensors using standard algorithms and complex information and generates an alarm when it detects the occurrence of any predefined events.

26. The system of claim 18 wherein the analysis platform uses procedural and behavioral algorithms to provide information about the data collected by the collection and transfer system.

27. The system of claim 18 wherein the coaching tools use the historical data to either determine the likely cause of the event and an action plan for responding to the event or predict the consequences of the event and determine a preventive action plan in response to the event.

28. The system of claim 18 wherein the monitor and the management system each includes sensor metadata that is information about how and when operating data for the power generation equipment is collected by the plurality of sensors and the particular units used to measure the collected operating data.

29. The system of claim 28 wherein the sensor metadata includes timestamps relating to the times that operating data is collected and recorded and the identification of the particular sensors collecting the data.

30. The system of claim 28 wherein the sensor metadata includes sensor alias mappings for identifying the sensors corresponding to a customer site where the power generation equipment is located.

31. The system of claim 28 wherein the sensor metadata includes a range values to validate the collected sensor operating data to insure that it is within the manufacturer's range for such data.

32. The system of claim 18 wherein the monitor is a desk top computer and the management system is a server computer.

33. The system of claim 18 wherein the plurality of coaching tools is selected from the group consisting of turbine sequencing, turbine alarms and engineering operational algorithms, and operational data.

34. A system for detecting predefined events occurring in operating power generation equipment and for diagnosing and responding to the predefined events, the system comprising:

first means, located where the power generation equipment is located, for analyzing operating data collected from the power generation equipment and for determining if any of the predefined events occurred during operation of the equipment;

means for collecting the operating data from the power generation equipment and for transferring the operating data to the first analyzing means;

second means, located at a location different from the location of the power generation equipment, for analyzing operating data collected from the power generation equipment and for storing and retrieving historical data pertaining to the operation of fleet power generation equipment and to the occurrence of the predefined events in the fleet power generation equipment; and

means for using the operating data, event data and historical data to determine how to respond to the occurrence of any predefined events in the power generation equipment.

35. The system of claim 34 further comprising an analysis platform including a first program resident in the first analyzing means for analyzing the operating data, and a second program resident in the second analyzing means for analyzing the operating data.

36. The system of claim 34 further comprising first means for storing the operating data collected by the collection and transfer means, the first storing means being included in the first analyzing means.

37. The system of claim 36 further comprising second means for storing the operating data collected and transferred by the collection and transfer means, the second storing means being included in the second analyzing means.

38. The system of claim 34 wherein the first and second analyzing means use procedural and behavioral

algorithms to analyze the collected operating data and decide whether a predetermined event has occurred.

39. The system of claim 34 wherein the coaching tools use the operating information to either determine the likely cause of the event and an action plan for responding to the event or predict the consequences of the event and determine a preventive action plan in response to the event.

40. A method of detecting predefined events occurring in operating power generation equipment and of diagnosing and responding to the predefined events, the method comprising the steps of:

collecting operating data for the power generation equipment and storing the operating data at a location where the power generation equipment is located;

analyzing at the location where the power generation equipment is located the operating data collected from the power generation equipment to determine if any of the predefined events occurred during operation of the equipment;

storing at a location different from where the power generation equipment is located historical data pertaining to the operation of fleet power generation equipment;

storing at the location different from where the power generation equipment is located the collected operating data and any determination as to the occurrence

of any of the predefined events in the power generation equipment; and

using the operating data, event data and historical data to determine if any of the predefined events occurred, and if so, how to respond to the occurrence of any predefined events in the power generation equipment.

41. The method of claim 40 wherein the step of analyzing the operating data comprises using procedural and behavioral algorithms to provide information about the operating data.

42. The method of claim 40 wherein the step of using the coaching tools comprises using the operating information to either determine the likely cause of the event and an action plan for responding to the event or predict the consequences of the event and determine a preventive action plan in response to the event.

43. The method of claim 40 wherein the step of analyzing the operating data comprises analyzing the operating data at the site at which the power generation equipment is located when the potential causes of the predefined events and the consequences of such events or action recommendations must be identified in an expedited timeframe to prevent further consequences from the occurrence of the predefined events.

44. The method of claim 40 wherein the step of analyzing the operating data comprises analyzing the operating data at the site at which the power generation equipment is located and analyzing the operating data

located at a second site at which the power generation equipment is not located when the potential causes of the predefined events and the consequences of such events or action recommendations need not be identified in an expedited timeframe to prevent further consequences from the occurrence of the predefined events.